Science Mission Directorate and Open Government

America's Space Program: Scientific Discoveries for Everyone
nasascience.nasa.gov ☒ Transparency ☒ Participation ☒ Collaboration

NASA leads the nation on a great journey of discovery, seeking new knowledge and understanding of our planet Earth, our Sun and solar system, and the universe out to its farthest reaches and back to its earliest moments of existence. NASA's Science Mission Directorate (SMD) uses space observatories to conduct scientific studies of the Earth from space, to visit and return samples from other bodies in the solar system, and to peer out into our Galaxy and beyond. Through our publicly available mission data sets, education and public outreach programs, Web sites, and other participatory exploration programs, we continue to extend our long tradition of openness and active community involvement in scientific exploration.

Overview

For years NASA's science program has been dedicated to openness, making all information public, and inviting participation in all aspects of NASA's science program. Early in NASA's history, we created a policy for all raw science data received from spacecraft to be stored in a publicly accessible archive for future researchers. As researchers conduct NASA-funded experiments, many of the results are published in peer-reviewed journals. But more than benefiting from just the results of these efforts, NASA engages the scientific community to help steer our science program in several ways:

- Prioritizing destinations of missions.
- Targeting future technologies.
- Posing the questions to be answered in astrophysics, Earth science, heliophysics, and planetary science.

Our flight missions range from suborbital projects—including balloons, sounding rockets, and airplanes—to interplanetary probes and flagship observatories. All investigations and missions selected and flown must respond to science goals and strategic

NASA and SERVIR

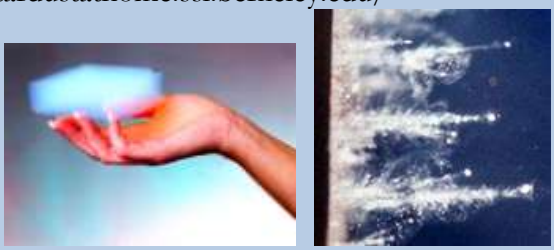
www.nasa.gov/mission_pages/servir/

Screenshot of real-time weather and earthquake visualizations on www.servir.net

The SERVIR regional visualization and monitoring system integrates Earth satellite observations and forecast models with data gathered on the ground for timely decision making to benefit society. SERVIR helps scientists, government leaders, and local communities address concerns related to natural disasters, disease outbreaks, climate change, and biodiversity. Begun in Latin America in 2005, a second node was created in Nairobi, Kenya in 2008. Thanks to this partnership, which includes USAID, the UN, and other organizations, our publicly available data helps to improve lives across the globe.

objectives that were crafted by the input from the science community. The majority of the approximately 70 spacecraft currently operating in space are selected after a competition. When we issue an Announcement of Opportunity, this is open for universities, NASA Centers, non-profits, Federally Funded Research and Development Centers (FFRDCs), industry, and international partners (on a no-exchange-of-funds basis). Finally, we also have a very robust research and analysis program and announce our Research Opportunities in the Space and Earth Sciences (or ROSES) together with other solicitation on the NSPIRES Web site (nspires.nasaprs.com). We use a peer review process to evaluate and select research proposals submitted in response to research announcements and archive previous solicitations and selections on the NSPIRES Web site.

Stardust @ Home
stardustathome.ssl.berkeley.edu/



Aerogel material in the Stardust Mission (left), tracks in aerogel that mark stardust entry and capture (right)

The Stardust mission returned the first pristine interstellar dust ever collected in space, and scientists are eager to "get their hands" on them. But first the particles have to be found! We estimate that Stardust collected only around 45 interstellar dust particles. They are tiny—only about a micron (a millionth of a meter) in size and are embedded in an aerogel collector 1,000 square centimeters in size. We used an automated scanning microscope to collect digital images of the Stardust interstellar collector at different depths, stacked images into movies giving us nearly a million movies to analyze. Thousands of Stardust@home volunteers around the world can view them with a special Virtual Microscope on the Web. Instead of taking years, this collaboration will accelerate the process down to several months to analyze the first interstellar dust particles brought to Earth.

We require our missions have robust education and public outreach (E/PO) programs. As policy, each mission dedicates at least one percent of their prime mission cost to E/PO, which equates to approximately $35 million annually. Many of the citizen engagement activities and participatory exploration projects come from the result of this policy. As an example of participatory exploration, through "DAWN Clickworkers" the public can help us count craters on two of the largest minor planets in our solar system—Ceres and Vesta. This information will help us better understand the age and impact history of their surface.

We understand the linkage between exciting scientific discovery and the aspirations for students to pursue science, technology, engineering and mathematics (STEM) degrees. As such, we provide university students the opportunity to develop, build, and operate science instruments on NASA spacecraft through our Student Collaboration activity. Initially started as a "bonus" criteria for new missions, we now have a new policy where Principle Investigators on NASA science missions are provided with an incentive (up to 0.5 percent of the cost of the mission) to fund the Student Collaboration. Such efforts could involve the development of an instrument, investigation of scientific questions, data analysis or modeling, development of supporting hardware or software, or other aspects of the mission. As an example, undergraduate students will operate Mooncam, the Student Collaboration on the GRAIL mission and provide the images to middle school students.

HiRISE Captures Public-Selected Images
http://uahirise.org/hiwish

Deposits on the Floor of Palos Crater, one of eight public-selected images taken on Mars by the HiRISE camera.

On March 31, 2010, the High Resolution Imaging Science Experiment (HiRISE) on the Mars Reconnaissance Orbiter delivered eight new pictures of Mars' surface that were all suggested by the public.

How This Fits into Open Government

We are a community of scientists and instill the principles of transparency, participation, and collaboration in everything we do to better understand our home planet, our sun, our solar system and the universe beyond. From establishing science priorities, selecting missions, conducting research, to making discoveries, a community of scientists, engineers, and sometimes even the general public play a pivotal role in ensuring our success. Since our mission data is publicly available on the Web anyone in the world can look at it and educators can freely get images and mission information for classrooms. We will continue to experiment with new ways of doing business and collaborating with new stakeholders. As demonstrated with E/PO and Student Collaboration, as successes occur we will solidify our practices with appropriate policy.

Useful Links

1. NASA Science Missions: science.nasa.gov/missions
2. NASA Science Research Programs: sara.nasa.gov
3. NSPIRES – NASA Research Opportunities: nspires.nasaprs.com
4. Student Collaborations: http://nasascience.nasa.gov/researchers/education-public-outreach/explanatory-guide-to-smd-e-po-evaluation-actors/SMD_SC_Guide_1_1%20508.pdf
5. NASA Science Partnerships: nasascience.nasa.gov/about-us/science-strategy/interagency-agreements/partnerships-table